DII-003-010407 Seat No. _____

M. Sc. (Sem. IV) (CBCS) Examination

May / June – 2015

C (PM) - 403 : Chemistry of Materials - I

Faculty Code : 003
Subject Code : 010407

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

Instruction: All questions carry equal marks

1. **Answer the following (Any Seven):**
   a. **Define**
      i. **Plastics**
      ii. **Young' modulus**
      iii. **Compliance**
      iv. **Volume resistivity**
   b. **Enlist common matrix and fiber materials.**
   c. **State the principle of DSC and TGA.**
   d. **Give an account of compounding.**
   e. **Explain α, β, γ and δ relaxation transitions in some polymers.**
   f. **State various techniques of assessment of thermal stability.**
   g. **List the applications of the composites.**
   h. **What are electrets? Also state the applications of the electrets.**
   i. **Give an account of industrial fibers.**
   j. **Give at least three examples each of natural and synthetic fibers and matrix materials.**
2. **Write note on following (Any Two):**
   a. **Ceramic fibers**
   b. **Dynamic mechanical behavior of polymers.**
   c. **Contact electrification**
   d. **Injection molding**
3. **Answer the following:**
   a. **Discuss creep and recovery in Kevin-Voigt model.**
   b. **Give an account of matched die molding, bag molding and closed molding method for producing PMCs.**

OR

3. Answer the following:
   a. Discuss the modification of the natural fibers.
   b. Discuss the factors affecting mechanical properties of the polymers.
4. Answer the following:
   a. Give an account of different types of optical properties.
   b. Describe types of glass fibers.
   c. Discuss different types of plastics.
5. Answer the following:
   a. What are bio and molecular composites? Also give the classification of composites on the basis of the reinforcement.
   b. Discuss TGA methods of multiple heating rates for the determination of kinetic parameters

OR

   b. Derive the Freeman-Anderson relation for the estimation of order of the reaction and energy of activation from a single heating rate DSC thermogram.
   c. A unidirectional glass-epoxy composite has a fiber volume fraction of 60%. Calculate the density, modulus and thermal conductivity of the composite using following data:

Component	ρ, kgm^{-3}	E, GPa	K, $Wm^{-1}K$
Epoxy	1250	6.01	0.25
Glass fiber	2540	80.0	1.05